this extensive and difficult family. However, the genus *Œdichirus* is one so extraordinary, that I am sure it will be noticed wherever the description of a new species of it may be found, be it by itself or amongst those of other Staphylinidæ. The case would be different if the object of the description were a *Homalota* or the like.

PROCEEDINGS OF LEARNED SOCIETIES.

ROYAL SOCIETY.

December 18, 1856.—The Lord Wrottesley, President, in the Chair.

"On the Scelidothere (*Scelidotherium leptocephalum*, Owen), a large extinct Terrestrial Sloth." By Professor R. Owen, F.R.S.

The extinct species of large terrestrial Sloth, indicated by the above name, was first made known by portions of its fossil skeleton having been discovered by Charles Darwin, Esq., F.R.S., at Punta Alta, Northern Patagonia. These portions were described by the author in the Appendix to the 'Natural History of the Voyage of H.M.S. Beagle.'

The subsequent acquisition by the British Museum of the collection of Fossil Mammalia brought from Buenos Ayres by M. Bravard, has given further evidence of the generic distinction of the Scelidothere, and has supplied important characters of the osseous system, and especially of the skull, which the fragments from the hard consolidated gravel of Punta Alta did not afford.

The best portion of the cranium from that locality wanted the facial part anterior to the orbit, and the greater part of the upper walls; sufficient however remained to indicate the peculiar character of its slender proportions, and hence Professor Owen has been led to select the name *leptocephalum* for the species, which is undoubtedly new.

The aptness of the epithet 'slender-headed' is proved by the author's researches to be greater than could have been surmised from the original fossil; for the entire skull, now in the British Museum, exhibits a curious and very peculiar prolongation of the upper and lower jaws, and a slenderness of the parts produced anterior to the dental series, unique in the leaf-eating section of the order *Bruta*, and offering a very interesting approximation to the peculiar proportions of the skull in the Ant-eaters.

The original fossils from Patagonia indicated that they belonged to an individual of immature age: the difference of size between them and the corresponding parts in the British Museum, depends on the latter having belonged to full-grown individuals: the slight difference in the shape of the anterior molars seems in like manner to be due

to such an amount of change as might take place in the progress of growth of a tooth with a constantly renewable pulp. Professor Owen finds at least no good grounds for inferring a specific distinction between the mature if not old Scelidothere from Buenos Ayres, and the younger specimen from Patagonia.

The author then proceeds to give a detailed anatomical account of the fossil bones in the British Museum, instituting a comparison between them and the bones of other large extinct animals, especially those of the Edentate order.

The Scelidothere was a quadruped of from 8 to 10 feet in length, but not more than 4 feet high, and nearly as broad at the haunches; the thigh-bones being extraordinarily broad in proportion to their length. The trunk gradually tapered forwards to the long and slender head. The fore-limbs had complete clavicles, and the rotatory movements of the fore-arm. All the limbs were provided with long and strong claws. The animal had a long and muscular tongue, and it is probable that its food might have been of a more mixed nature than that of the Megatherium. But it was more essentially related to the Sloths than to the Ant-eaters.

In conclusion the author remarks, that as our knowledge of the great Megatherioid animals increases, the definition of their distinctive characters demands a more extended comparison of particulars. Hence in each successive attempt at a restoration of these truly remarkable extinct South American quadrupeds, there results a description of details which might seem prolix and uncalled for, but which are necessary for the proper development of the task of reproducing a specimen of an extinct species.

Professor Owen adds, that he is indebted to an allotment from the Government Grant, placed at the disposal of the Royal Society for scientific purposes, for the means of laying before the Society large and admirably executed drawings of the fossil bones described in his paper.

January 29, 1857.—Major-General Sabine, Treas. and V. P., in the Chair.

"On the Nervous System of *Lumbricus terrestris*." By J. Lockhart Clarke, Esq., F.R.S.

In the summer of 1855, with the view of throwing some light on other researches in human anatomy, in which he was already engaged, the author undertook some anatomical inquiries on the nervous system of Invertebrata; but finding them occupy more time than he could spare, he was compelled to relinquish the pursuit after having made many interesting but desultory observations on various animals. As he had proceeded, however, to a considerable extent with the nervous system of *Lumbricus terrestris*, and discovered in it much that is important and was hitherto unknown, he has thought it expedient to resume and complete this portion of the subject without further delay.

Before treating of the nervous system it was necessary—in order to show the proper functions of many of its parts—to give some account of the organs of prehension, deglutition and digestion; and as these are insufficiently explained elsewhere, the author has described them entirely from his own dissections and observation.

The first anterior segment is a conical or nipple-shaped projection inserted behind into the upper fifth of the second segment, or first ring. Its dorsal surface is covered, except in the centre, by concentric laminæ and irregular masses of pigment-granules, which are interspersed with large, peculiar and nearly pellucid cells. Its under part forms a soft and delicate pad, or upper lip, and is continuous at the sides with the inferior half of the second segment, or under lip, to complete the oral orifice from which the mucous membrane of the mouth is reflected inwards. The mouth is a wide tube surrounded by a delicate muscular coat, and attached to the outer tube, or rings, by fine muscular bands. Behind, it dilates into a capacious heart-shaped sac, of which the roof or upper wall is covered by a thick oval muscular mass. The outer portion of this mass is divided into distinct, radiating, digital muscles which connect it on all sides and are continuous with the longitudinal muscles of the rings. Its inner surface projects anteriorly into the cavity of the pharynx, in the form of a thick circular disc or sucker, surrounded by loose folds of mucous membrane. Opening into the sides of the mouth and pharynx are two or three sets of salivary glands, which consist of convoluted tubules, resembling those of Lepidopterous insects: these glands have not been hitherto detected in *Lumbricus terrestris*. The pharynx contracts into a comparatively narrow œsophagus, which in its turn dilates into a capacious crop; and this immediately opens into a cylindrical gizzard composed of a ring of cartilage, with an external muscular coat, and a lining of mucous membrane. A long straight and narrow intestine extends through the rest of the body, and is covered throughout with yellow, follicular, hepatic glands in circles corresponding to the segments.

Nervous System.—The central organs of the nervous system consist chiefly of a bilobed cephalic ganglion, and a double chain of subventral ganglia extending through the whole length of the body. The lateral lobes of the cephalic ganglion are pyriform, and united by their broader ends in the mesial line. The small end of each divides into two nerve-trunks, of which one forms the root of its cephalic nerves, and the other, the pharyngeal crus, which curves round the side of the pharynx to join the first subventral ganglion. Each crus gives off eight or nine branches. The first four or five arise from the under part of its anterior half, and immediately enter the upper surface of a minute and delicate cord-like chain of ganglia, the enlargements of which correspond to them in number and size. This highly interesting structure lies on the side of the pharynx, concealed beneath the crus. The breadth of its first ganglionic enlargement in a good-sized worm, was the $\frac{1}{200}$th of an inch; that of the last the $\frac{1}{130}$th; the pharyngeal crus, where their roots come off, was $\frac{1}{100}$th of an inch in diameter. Each border of the chain gives off

several trunks of considerable size, which immediately communicate to form a continuous plexus. The part of the plexus on the inner side is much the larger, and supplies anteriorly, the muscular and mucous coats of the mouth as far as the lips; and posteriorly, the pharynx and suctorial disc; uniting in both directions with its fellow of the opposite side. The outer part supplies the muscular bands and salivary tubules. From the pharynx, the plexus descends along the side of the œsophagus, lying on the abdominal vessels, and communicates with minute filaments from the nerves of the subventral ganglia.

The whole of this little chain with a large portion of its plexus and the wall of the pharynx on which it lies, was removed and examined under a $\frac{1}{8}$th-inch object-glass, when a beautiful and unexpected appearance was observed. The under surface of the *entire* chain—cords as well as ganglia—was covered with a lamina of round, oval, and pyriform cells; and on its upper surface a row of cells of the same kind was found along each border. At every point of communication between the branches which form the plexus, a minute ganglionic enlargement was observed, from which new branches proceeded to form other enlargements of the same kind. Every branch communicated by loops with those adjacent, and by transverse fibres with those of the opposite side, giving to the ganglionic points a kind of stellate appearance. In these microscopic ganglia, the nerve-cells, similar to those of the chain, were accumulated chiefly about the angles, along the borders, and extended some distance into the principal trunks; but very few could be seen in connexion with nerve-fibres, which ran around and between them, however, in an intricate manner. As the plexus extended from the chain, the ganglionic points diminished in size, while the smaller branches given off from the trunks increased in number, and communicated like a capillary network. At the same time the ultimate fibres became paler, flatter, more parallel, and acquired nuclei like those of cells. This was particularly observed in those distributed to the mucous membrane. The above observations were repeated on nearly forty different specimens.

On considering the parts which it supplies, this little chain appears to combine the office of a sympathetic with certain other functions which in many Invertebrata are entrusted to separate and special centres;— such as the labial, pharyngeal, and visceral ganglia in Cephalopodous and Gasteropodous Mollusca, and the separate parts of the stomato-gastric system of Insects, which, although derived from different sources, are in intimate communication with each other. The lateral ganglia in Insects have the same position as the little chain of *Lumbricus*, on the side of the pharynx, which, according to Mr. Newport, is supplied entirely by them; they arise, however, wholly from the cephalic ganglion, while the chain in *Lumbricus* has just been seen to take its origin both from this and the pharyngeal collar; but then, in orthopterous insects, the gangliated recurrent nerve, which is always in intimate connexion with the lateral ganglia, arises entirely from the pharyngeal crus; and the fact has been observed by Burmeister, Brandt and Müller, that in some other orders

these two parts, in regard to size, are in the inverse ratio of each other. In Crustacea also, the whole of the pharyngeal, gastric and visceral nerves take their origin from the crura, as was first shown by Audouin and Milne-Edwards.

The second set of nerves from the pharyngeal collar come off from its posterior half, and communicate with each other by loops before they leave it. The first and largest sends some filaments to the muscular bands of the mouth, upon which they communicate by evident but slight dilatations with the plexus of the pharyngeal chain; and after supplying the muscles of the anterior segments, are lost in the integument of the lower lip. The rest take nearly the same course. But what is extremely interesting, the roots of this set—at least of the first and second branches—are continuous across the crus with those of the former set which belong to the pharyngeal chain; and many of their fibres may be traced not only into its ganglia, but through the trunks which proceed from their opposite sides to form the pharyngeal ganglionic plexus; so that the nerves distributed to the labial muscles and integument of the outer tube, and those which supply the inflected oral and pharyngeal tube, are in direct continuity, not only at their peripheral extremity, but at their roots also, through the common centre which presides over the whole of the digestive apparatus. A similar connexion will be seen to exist with regard to the cephalic nerves.

The subventral chain is a double cord gangliated at short intervals by the addition of vesicular substance. Anteriorly the cords are separate and continuous with the pharyngeal crura of their respective sides; but through the rest of their course they lie in close contact along the middle line. The ganglionic enlargements vary somewhat in size, shape, and approximation at different parts. The vesicular substance is on their under surface, and consists of about two strata of cells continuous in a lamina across both cords. Along their borders, however, the cells form a thicker layer or column, which extends for some distance along the intervening cords. In form and general appearance the cells are similar to those of the pharyngeal chain, but many of them are larger. Those of the first ganglion extend into the lower parts of the crura, and are continuous behind with the lamina of the second. Each ganglion gives off from its sides two pairs of nerves, which, after sending some filaments to the septa and muscular bands, supply the longitudinal, oblique and circular muscles of the rings. Midway between the ganglia, the intervening cords give off a single pair, which are distributed to the deep muscles on each side. Within the ganglia the roots diverge in three different ways:—1, longitudinally; 2, transversely; and 3, to the grey or vesicular substance. The first or longitudinal form a large portion of the nerves, and run in equal numbers in both directions—backwards and forwards,—along the whole breadth of the corresponding cord. In their course, some of them, near the border, separate in succession from the rest and enter the lateral columns of cells; others proceed as far as the next nerve, with the roots of which they form loops, and pass out, while the rest continue onwards and, perhaps, in suc-

cession form similar loops with distant nerves. In former communications to the Royal Society, the author has shown that the same kind of arrangement exists in the spinal cord of Man and Mammalia.

The second or transverse order of fibres are less numerous, and in general less distinct than the last. They proceed from the middle of each opposite root, and cross the cords directly; but some of them, on reaching the opposite cord, turn round in both directions, and run with its longitudinal fibres. In front of the first ganglion, in which they are unusually distinct, a separate band unites the roots which descend from the branches arising from the opposite crura of the pharyngeal collar.

The third order of fibres, or those distributed to the vesicular substance, spread out in all directions, but always—except in the lateral layers or columns—beneath the superficial stratum. After nearly fifty separate examinations, with all the resources of the microscope, the author has not been able, in more than two or three instances, to trace an undoubted continuity between the cells and nerve-fibres. Fibres in abundance may be seen in connexion with the cells, but the greater number of these are not nerve-fibres. Nevertheless, there is reason to believe that such a connexion does frequently exist, but is obscured by certain peculiarities of structure. Still it is quite certain that a vast number of fibres pass by or around the cells near their origin, and many often appear to terminate in loops.

Cephalic Ganglion.—This rests on the commencement of the pharynx, beneath the dorsal part of the third ring. Each lobe is a pyriform sac, which is very thick and convex posteriorly, where it is partially separated from its fellow by a deep notch. This convex portion is opaque-white, and filled with a mass of semifluid granular substance, and oval, round and pyriform cells, of various sizes, but often very large. Some of the latter kind are exceedingly elongated. The anterior half, by which the lobes are joined, is merely *lined* with a *lamina* of cells, and only at its upper part, its under side having a cell here and there. The *interior* of this portion is entirely *fibrous*, and consists of a broad transverse commissural band derived from the pharyngeal collar, and of fibres from the roots of the cephalic nerves. Each crus of the collar enters its lobe on the *under* side. Some of its fibres curve backwards to the convex vesicular mass; others ascend to—perhaps partly terminate *in*—the cells near the roots of the cephalic nerves; and the rest cross transversely as the broad band, to be continuous in front of the notch with that of the opposite crus. The cephalic nerves are attached to the *upper* part of the ganglion. Many of their roots cross transversely with the crural band, to form loops with those of the opposite lobe. Decussating these, a considerable number run down the pharyngeal crus, and enter the pharyngeal chain of ganglia through its first and second roots, at least,—perhaps through all,—and probably form loops with the other set of branches of the crus. The remaining fibres of the cephalic nerves spread through the vesicular substance, partly describing curves and undulations in the corresponding lobe, and com-

municating in part with the other in the mesial line, where they form a kind of indistinct decussation in front of the notch.

Distribution of the Cephalic Nerves.—Their roots on each side immediately separate into two trunks, a lower and upper. The former runs above the mouth, to the under side of the first conical segment, or upper lip. Here it divides into several branches, which supply its muscular bands, and then terminate in the integument as a plexus, which appears to communicate with that from the first enlargement of the pharyngeal chain, spread over the tubular mouth, which is itself continuous with the upper lip. The upper trunk proceeds directly to the corresponding part of the same segment, and there divides into two branches, of which one in particular, after running the course of the pigmentary laminæ, and giving off a series of short filaments, terminates at the point, beneath the integument.

In the pigmentary laminæ the nerves form an intricate plexus, and the impression was that many of their ultimate fibres end in loops. They were never seen to be directly connected with the large clear cells scattered through the substance. Nor is there any ground for conjecture with regard to the office of these cells: perhaps they are intended for the transmission of light. From the structure of the segment and the distribution of its nerves, it is not unreasonable to think that its upper surface may be instrumental in the perception of diffused light; and that its under surface and point may be subservient not only to the sense of touch, but perhaps also to that of smell, in a low degree. That it forms an important organ of search, is pretty evident from the manner in which it is projected alternately forwards and from side to side, as the animal advances in its course.

The upper side of the cephalic ganglion corresponds to the under side of the subventral, and several points of resemblance are indicated between the two kinds of centres. Each pharyngeal crus is shown to be a compound structure, composed of different sets of connecting fibres,—1, between its own nerves, which supply, on the one side, the cephalic portion of the outer tube, and on the other, the corresponding part of the alimentary tube reflected inwards from the former; 2, between these nerves and their fellows of the opposite crus, across the front of the first ganglion; 3, between the same nerves and the cephalic ganglion; and 4, between the cephalic ganglion and the same side of the whole subventral chain. Now there is this point of *difference* between the two kinds of centres compared together,—that while the last-mentioned set of fibres on the one side is continuous with that on the other, as a transverse band through the cephalic ganglion, the subventral cords, although continuous with these on their respective sides, form no such connexion with each other across the lateral halves of their own ganglia, but run parallel and directly *backwards* through them. Such a communication, however, is established for the latter, individually, by the transverse fibres of their *own nerves*; and just as these fibres unite the lateral halves of each *separate* ganglion, *independently of the cephalic*, so do the last-mentioned set of fibres of the crura con-

nect together the two lateral halves of the *entire chain in* and *through* the cephalic ganglion, which is their dominant and controlling centre.

Two parts of the human brain may be compared to this transverse cephalic band. One is the arched and commissural band of fibres prolonged through the corpora quadrigemina, from the upper and inner part of the fillet on each side. But the outer part of the fillet turns forwards and upwards beneath the corpus geniculatum internum and optic tract, to enter the optic thalamus. It is not improbable, therefore, that some of the fibres of the tract may descend along this portion of the fillet, to form loops with the roots of the fifth nerve, over which it passes, since in *Lumbricus* it has been seen that many of the roots of the cephalic nerves run down the pharyngeal crus to form loops with others to which it gives origin. In a former memoir by the author, it was shown that some of the roots of the spinal accessory nerve reach the anterior grey cornu and mingle, perhaps pass out with, the spinal roots; and he has since observed the equally interesting fact, that the same nerve forms a similar connexion with the vesicular nucleus of the hypoglossal, which may be considered a representative of the anterior spinal. The spinal-accessory, therefore, takes its origin from at least three different sources,—from its own nucleus, and from the nuclei of the hypoglossal and anterior spinal nerves. The peripheral communications of both the former with the latter nerves in the cervical plexus is well known. The author believes he has also made out an intimate connexion by loops between at least the portio intermedia of the seventh and the large root of the fifth nerves within the substance of the human medulla.

The other part of the human brain which is analogous, or homologous with the cephalic band of *Lumbricus*, is the corpus callosum. Gall and others have thought that the fibres of this structure arise from the grey substance of the hemispheres; while some have endeavoured to show their continuity with those of the crura cerebri. Now it is quite certain that in the cephalic ganglion of *Lumbricus*, a large proportion of the commissural fibres are directly continuous with those of the pharyngeal crura; and there are appearances which favour the conclusion that some of the latter are confined to the lobe on their own side. From *analogy*, then, we may infer, that while a large portion of the crura cerebri are directly continuous with the corpus callosum, some of their fibres *probably* terminate in the cerebral convolutions of the corresponding side.

From what has been shown, it is evident that the communications between the roots of nerves are more intimate and extensive than they were hitherto believed to be; for it has been seen that the roots not only of every spinal nerve, but of every other in the system, communicate with those which *correspond* on the *opposite*, and with those which are *adjacent* on the *same* side. Of the cephalic with the two sets from the pharyngeal collar, and of the latter with each other, the connexions are particularly interesting, and may serve as guides to future investigations on other forms of the nervous system.

By experiments that were made on the living worm, it is shown that the pharyngeal chain of ganglia are independent of the other nervous centres, although subject to their influence, and are not only competent of themselves to preside over the complicated movements of the suctorial pharynx and mouth, but appear also to be centres of reflex action.

The present memoir concludes with some observations and remarks on the ganglionic cords of other Invertebrata.

"An Account of the two Methods of Reproduction in *Daphnia*, and of the Structure of the 'Ephippium.'" By John Lubbock, Esq., F.G.S.

In this paper the author describes the male organs and the structure of the Ephippium in the genus *Daphnia*, and the double method of reproduction by agamic and ephippial eggs. The author calls the non-ephippial eggs agamic, but it is possible, though not probable, that the ephippial eggs may be agamic also. In the male *Daphnia* there are two small papillæ above the posterior claws, but on the ventral side of the anus, and on these being compressed, two streams of minute rod-like bodies, with movements so gentle as to be scarcely visible, will be seen to issue, one from each papilla. Nothing similar has ever been observed in the female; nor has any other sort of spermatozoa ever been met with. These male organs have never been described before.

The author then proceeds to describe and figure the two sorts of eggs in their earlier stages, which have not yet been mentioned by any naturalist. The ephippial eggs differ from the agamic in their determinate position and number. As a general rule, that is to say, in seventeen cases out of twenty-three, the author has remarked that ephippial eggs commence and are developed to a certain point.

The development is as follows. One of the ovarian cells, always at the posterior part of the ovary, swells a little, and becomes a germinal vesicle; round it are deposited a number of brownish granules, while the other cells which may at first have existed in the same ovarian mass cease to be visible. The deposition of dark granules, in thirty-seven cases out of forty, after proceeding to a certain point, ceased, and the embryo egg gradually disappeared. In the other three cases it increased, and at length formed a dark mass on each side of the intestinal canal. The author in two cases observed the ephippial eggs pass from the ovary into the receptacle.

The ephippium has been described by Strauss with considerable accuracy, but he has been more or less misunderstood by all subsequent writers on the subject, and no one has explained the homologies or connexions of the inner valve. The ephippium itself is a locally altered portion of the carapace; the outer valve of the ephippium being a part of the outer layer of the epidermis, and the inner valve the corresponding part of the inner layer. In consequence of this arrangement, the inner valve of the ephippium, containing the ephippial eggs, is not attached by the hinge to the outer valve, as has been generally stated, but actually lies at first in

the receptacle formed by the new carapace. The ephippium is cast with the rest of the skin, from which however it soon becomes detached, and continues to form an efficient protection to the eggs until they are hatched. These eggs probably require to be fertilized, but this fact is not completely proved. With one exception, whenever the author observed ephippia, he could also find males; and, generally speaking, the numbers of each were in proportion to one another. Impregnation is not, however, absolutely necessary to the production of ephippia, as the author has now in his possession three ephippia, formed by isolated females. It remains to be seen whether young will be developed from these or not.

The early stages of the agamic egg are very similar to those of the ephippial egg, and consist of the enlargement, in the front part of the ovary, of one of the ovarian cells, which then becomes a germinal vesicle, and the deposition round it of granules, with the addition in this case of oil-globules. This process continues, the other two or three cells which may have existed in the same ovarian mass gradually disappear, and there is thus formed an egg-like mass, consisting of a germinal vesicle, minute dark granules, and large oil-globules. When the growth is nearly completed, the vitelline membrane is added. This is at first very delicate, but after deposition in the receptacle soon becomes hard. The ovarian eggs of *Daphnia*, as well as those of *Cypris*, never contain round masses like those of *Aphis* and *Musca*; but after their entry into the receptacle, yelk-masses are found, homologous with those present at the corresponding periods in *Phryganea**. The eggs when laid are about $\frac{20}{2000}$ of an inch in diameter; they gradually become $\frac{26}{2000}$, when the vitelline membrane splits and falls off, and the young animal is hatched. Far, however, from resembling its parent at this time, the young Daphnia is a spherical bag, inside which the formation and development of the new organs is rapidly progressing†. Instead therefore of undergoing no metamorphosis, the young Daphnia only assumes the well-known characters of the genus after the first changes of skin. The author proceeds to compare this phænomenon with a similar one observed by Mr. Spence Bate in *Gammarus*, by Prof. Huxley in *Mysis*, by Dr. Cohn in *Sphæroplea*, in many Annelids, and in the interesting entozoon *Monostomum mutabile*. The young Daphnia attains a length of ·025 inch before it leaves the receptacle of the mother, but the length of time during which it remains therein varies according to the temperature. The author has never met with an exception to the rule noticed by preceding writers, that unisexuality is characteristic of an agamic brood.

It follows from these observations, that the self-fertile Daphniæ

* The round balls described by Herold in the ovarian eggs of *Bombyx*, appear to be of a different nature, and homologous with the Nahrungsdotter mentioned by Carus in spiders' eggs and the oil-globules of *Daphnia*.

† It is worthy of notice, that the back fold indicating the divisions between the head and body is opposite the line between the mandibles and the first pair of maxillæ, which latter appear therefore to belong to the body, as Zaddach also asserts, and not to the head.

are certainly true females, and that the reproductive bodies more nearly resemble eggs than gemmæ in their origin and development. Hereafter, however, it may be convenient to give a separate name to those egg-like bodies, which are fertile without impregnation, but for the present they must be called eggs.

The author then gives a list of the instances of Parthenogenesis which, so far as he knows, are recorded among the Articulata. Finally, he expresses the belief that the careful consideration of these cases, and of the facts now recorded as to *Daphnia*, and the still more wonderful observations recently detailed by Siebold in regard to *Apis* (if these latter are confirmed), must surely remove all lingering doubts as to the identity between eggs and buds; and remarks, that if Prof. Huxley's definition of "individual" and "zooid" is to be adopted, it will be impossible to assert of any Daphnia or Moth, whether it is the one or the other, and the Hive-bee will have to be considered as an hermaphrodite, a species without male individuals.

Under these circumstances, the author suggests that it would be more convenient to continue, as heretofore, to call the individual of any species that which is individualized, even though in this case the individuals of one species will not always be homologous with those of another.

BOMBAY BRANCH OF THE ROYAL ASIATIC SOCIETY.

November 13, 1856.—W. E. Frere, Esq., C.S., President, in the chair.

"Transformation of the Vegetable Protoplasm into *Actinophrys*." By H. J. Carter, Esq., Assistant Surgeon H.C.S. Bombay.

The author stated, that when he first entered upon the study of the Infusoria and freshwater Algæ, he had no idea of any union existing between the two, further than that of a gradual approximation of form and organization: and that he was opposed to any sudden leaps from the animal into the vegetable kingdom or *vice versâ*, might be seen by the facts which he had brought forward, in attempting to account for the transformation that takes place in the *Characeæ* when the contents of their cells undergo the changes which he had described on a previous occasion (Annals, vol. xvii. p. 101, &c.). But latterly his opinions had altered, and he was now compelled to view these transformations as a direct passage of the protoplasm into Monads.

The process which ends in this development had been called by Nägeli "abnormal cell-formation," and Nägeli thought that in some instances germs were thus produced which propagated the plant. Nor could Pringsheim come to any other conclusion than that they were reproductive in *Spirogyra*, where he had more particularly observed them; while the philosophic Alexander Braun, after recapitulating all that had been made known on the subject in his 'Rejuvenescence in Nature,' adds, "the future will certainly unfold many interesting phænomena in this hitherto little-worked field."

Before detailing his observations on this development in *Spirogyra*